Spatial Disorientation Accidents in U.S. Army Rotary Wing Aircraft FYs 1996-2000

Preliminary Examination

Methods

- Summaries of all class A-C accidents from 1 October 1995 to 31 September 2000 were obtained from the U.S. Army Safety Center.

- The minimum standard for this review was that SD was “more probable than not” rather than “absolute certainty.”

Methods

- Accidents were classified into one of the following groups:
  - SD - spatial disorientation was a major or contributory factor of the mishap
  - Non-SD - spatial disorientation did not occur
  - Unknown - the cause of the mishap can not be determined

Methods

- This study used the following definitions of SD:
  - "The situation occurring when the aviator fails to correctly sense the position, motion, or attitude of his aircraft or himself within the fixed coordinate system provided by the surface of the earth and the gravitational vertical"

    (Benson, 1978)
  - "The erroneous perception of the aviator's own position, motion, or attitude to his aircraft, or of his aircraft relative to another aircraft"

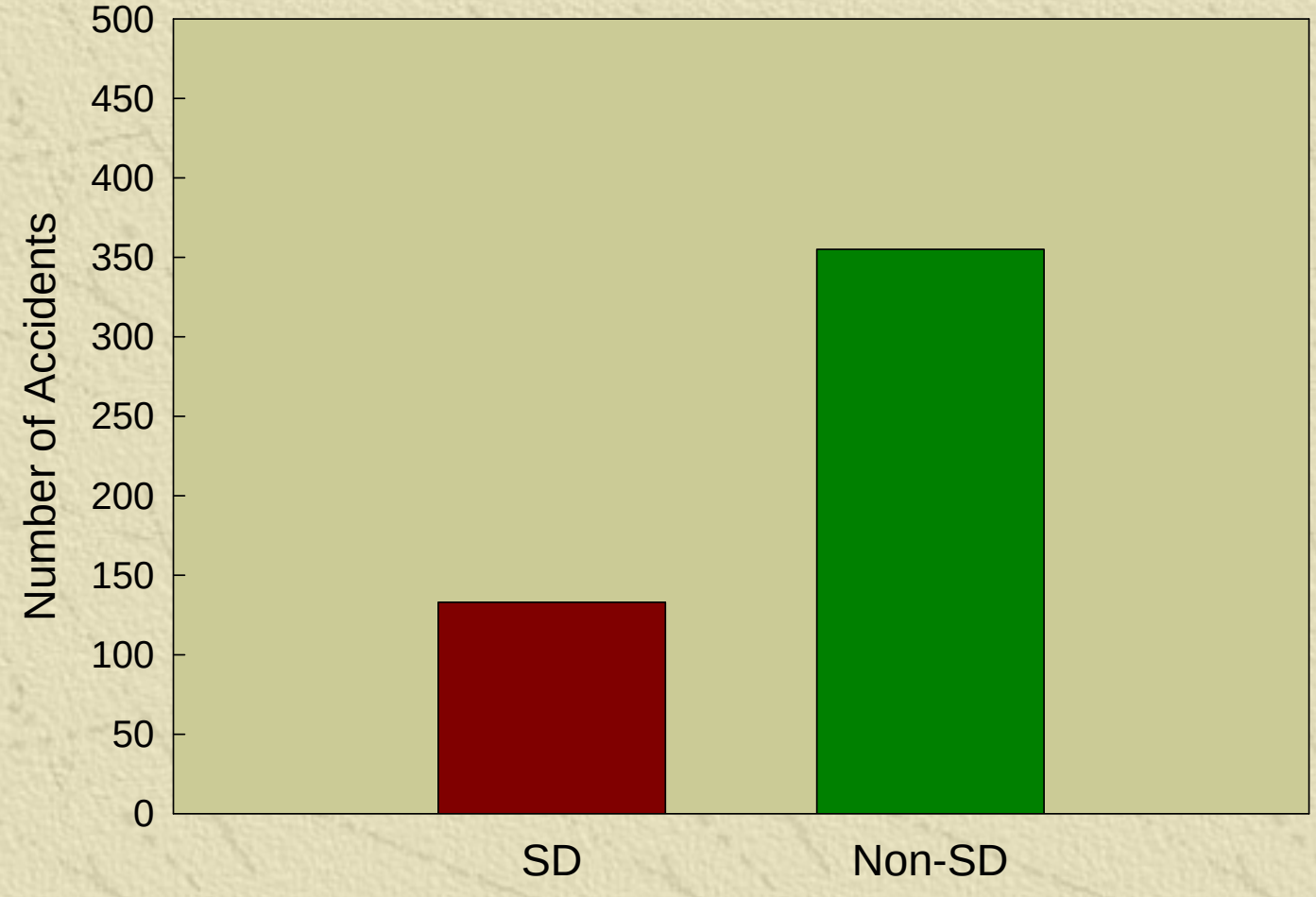
    (Vyrnwy-Jones, 1988)
  - Geographic disorientation (getting lost) was excluded

Data for FYs 96-00

- Accident data were classified as follows:
  - Total 505
    - SD - 133
    - Non-SD - 355
    - Unknown* - 17
    - Total used – 488

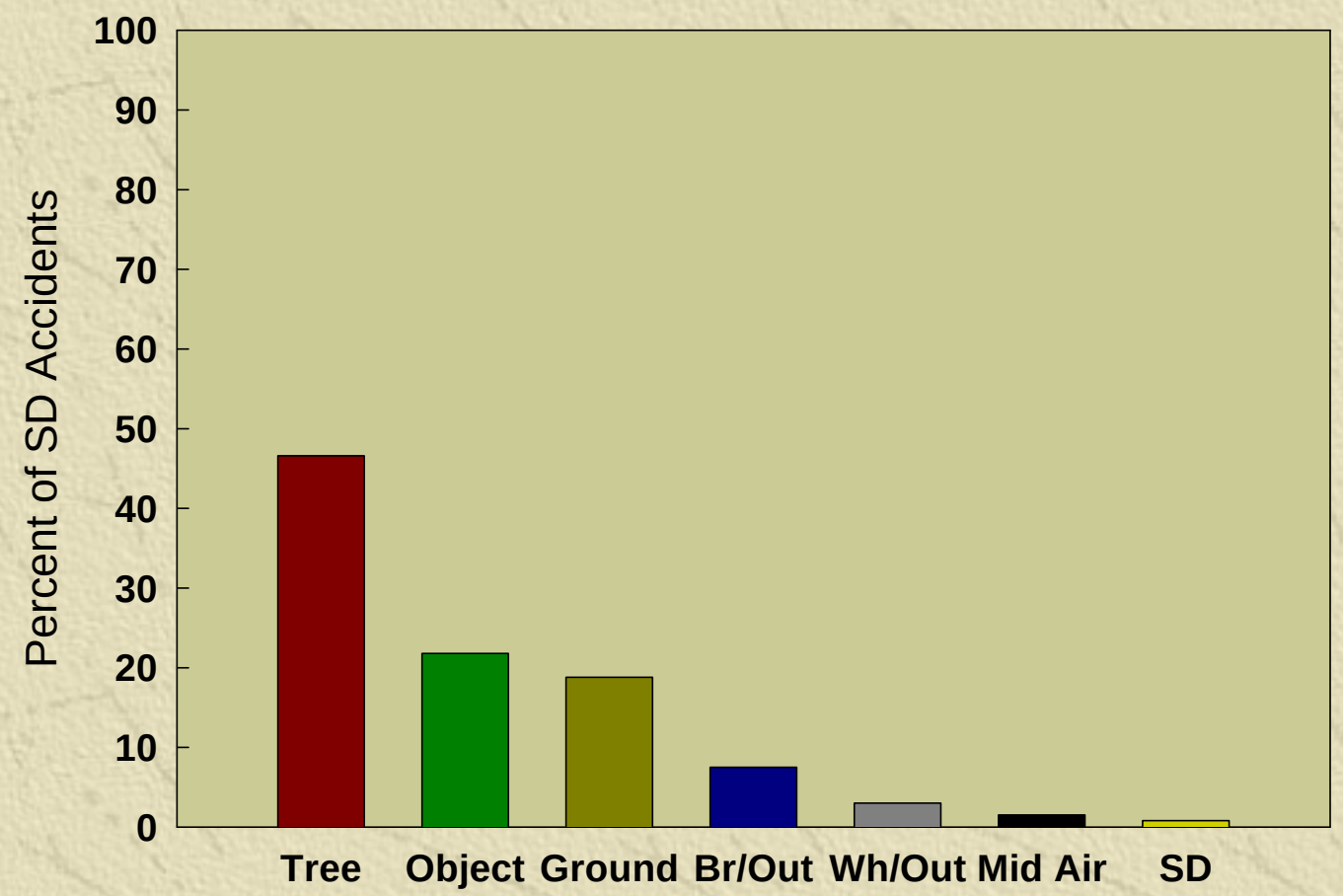
*Unknown were dropped from this examination

Results



SD played a role in 133 (27%) of the 488 accidents which could be classified.

Results



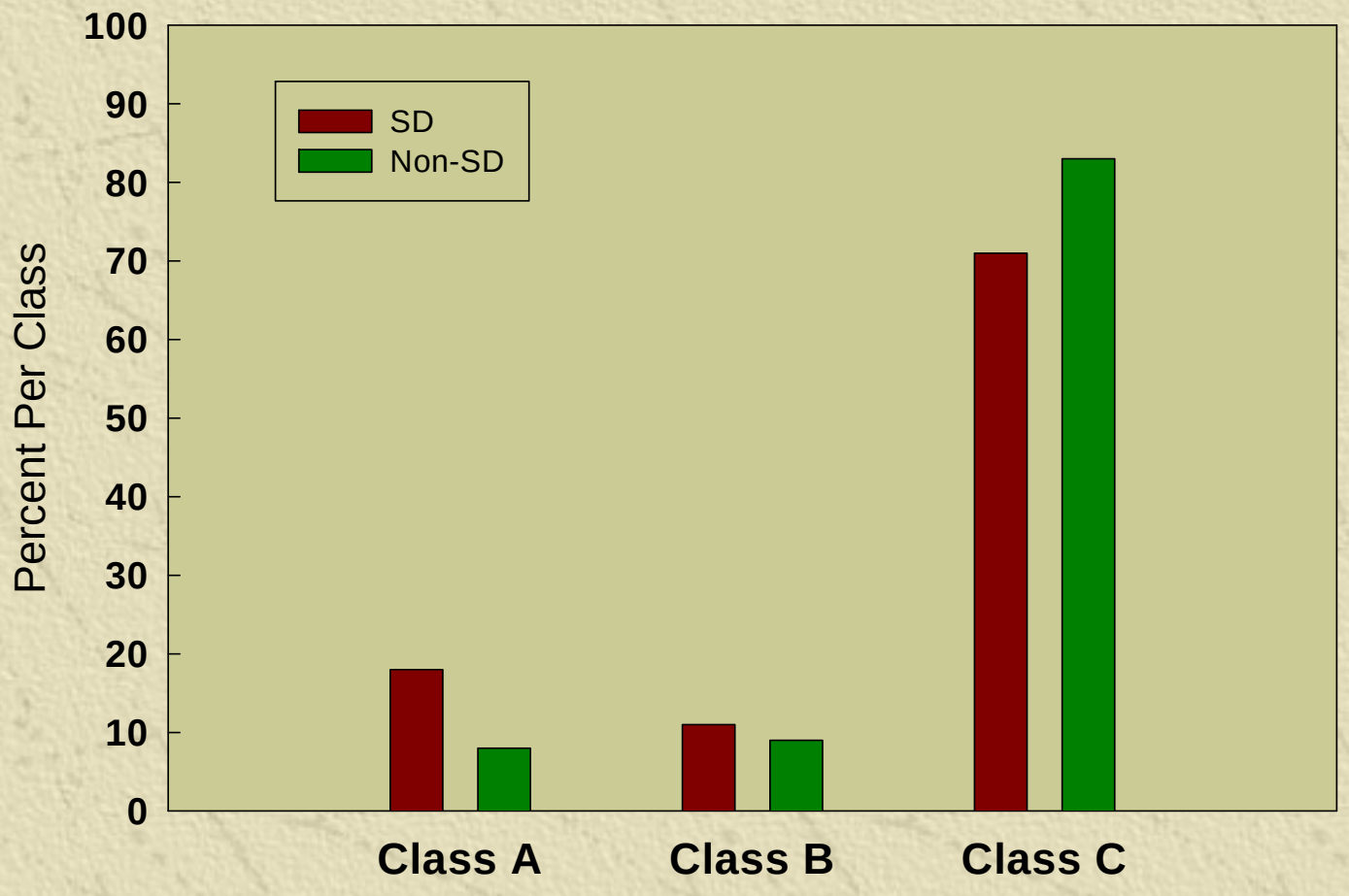
Accidents due to inadvertent drift, misjudging distances, white outs, brown outs, and SD.

Results

	AH1	UH1	AH64	AH64D	CH47	MH47	OH58	OH58D	UH60	MH60
Accidents/ 100,000 hr	13.5	4.17	15.83	13.23	22.21	23.80	4.19	25.14	9.90	26.03
SD accidents/ 100,000 hr	4.49	1.04	5.40	5.71	1.79	2.16	8.34	5.95	3.36	11.71

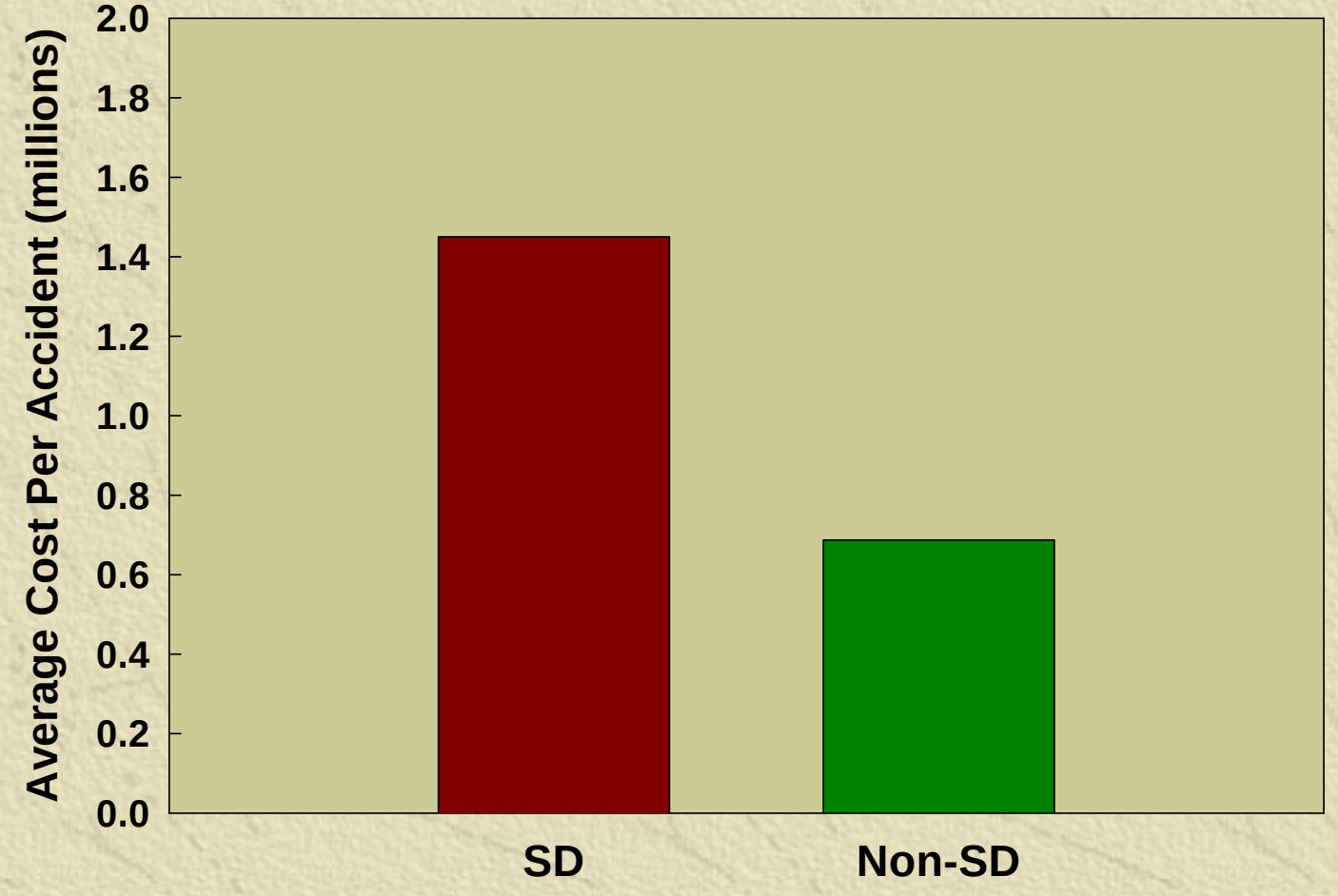
Total and SD accident rates per 100,000 flight hours broken down by individual airframes.

Results



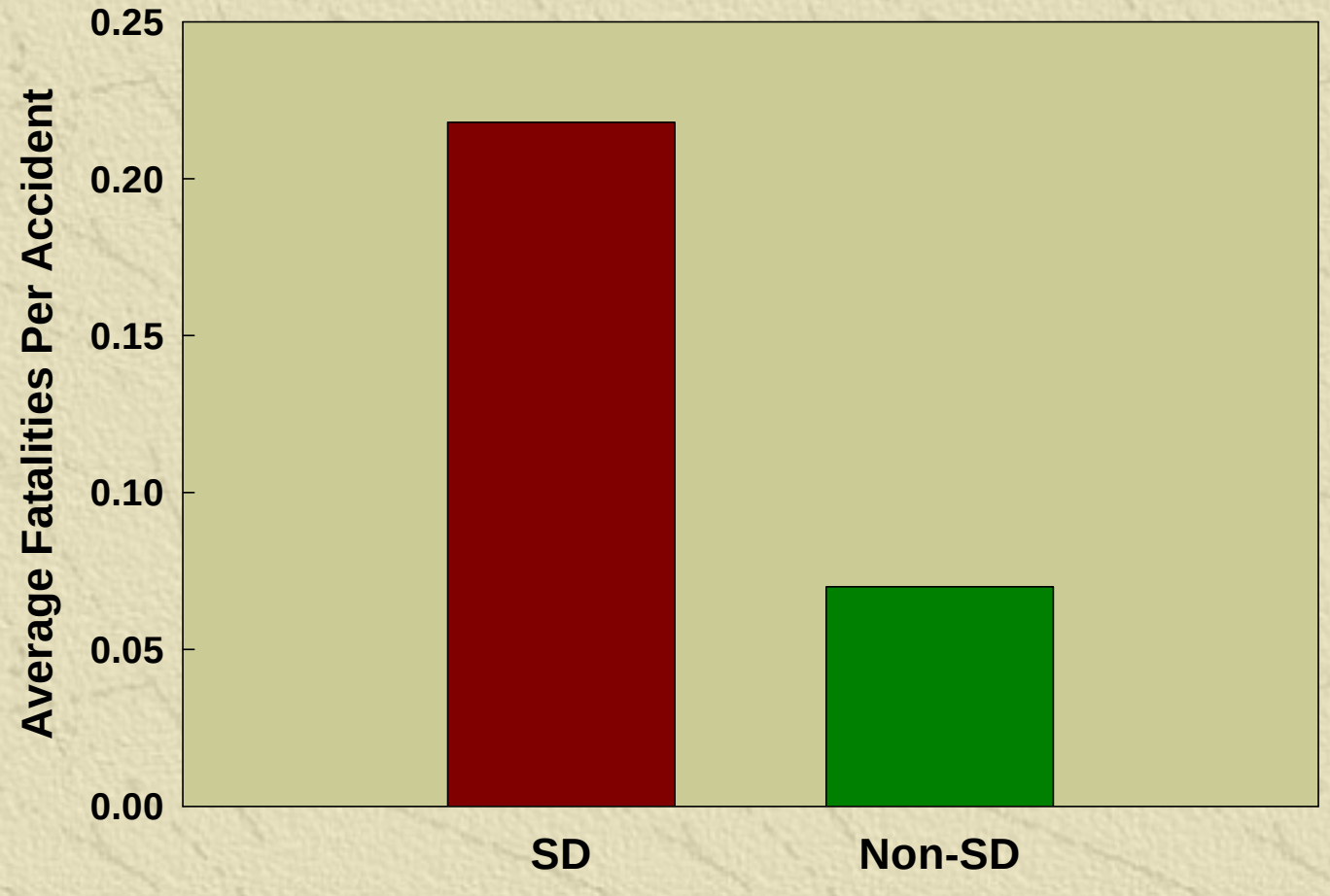
The percent of SD related Class As was double that of Non-SD. SD Class Bs were only slightly higher while SD Class Cs were 12% lower than Non-SD.

Results



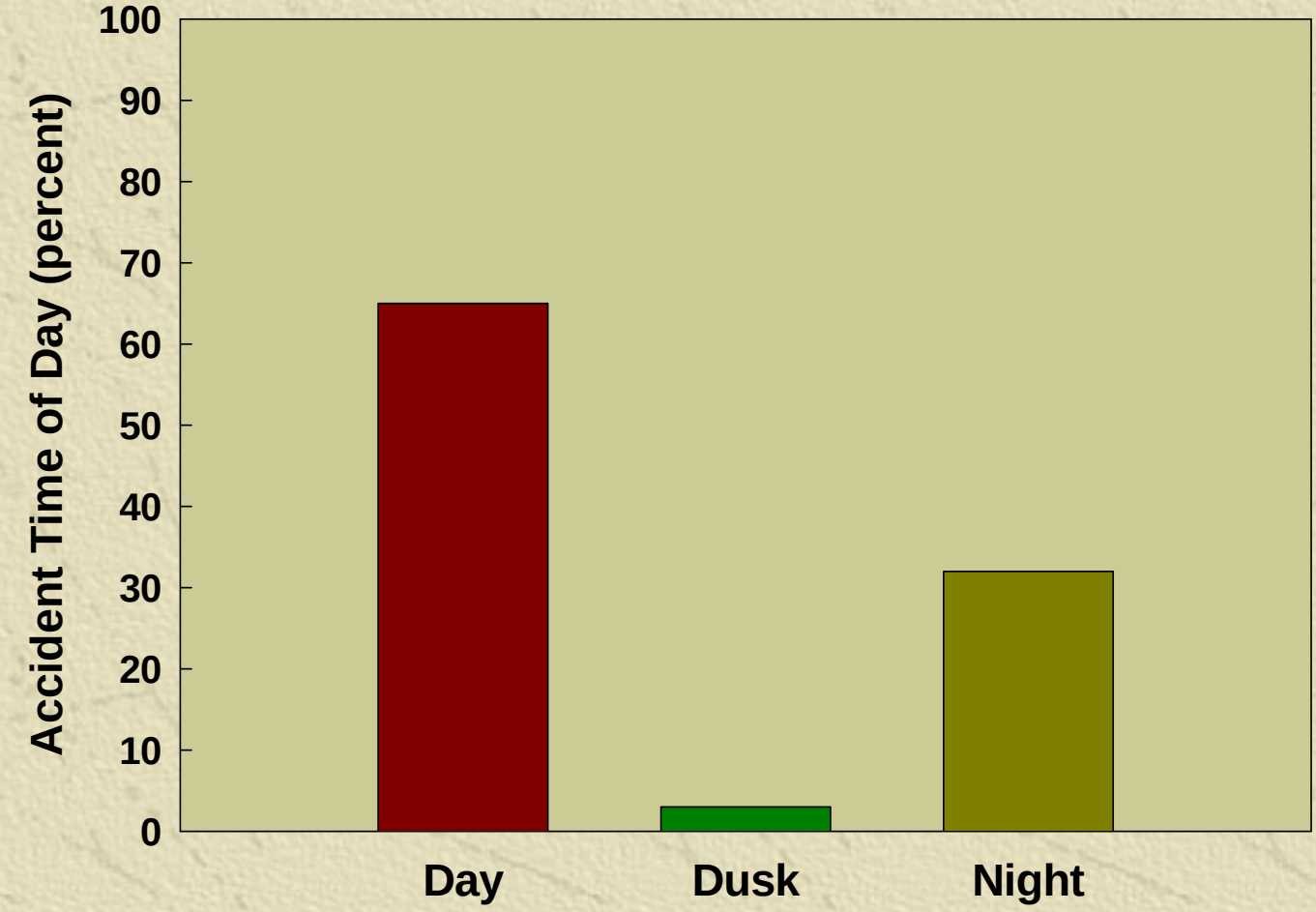
The average cost of an SD accident was more than double that of a Non-SD accident.

Results



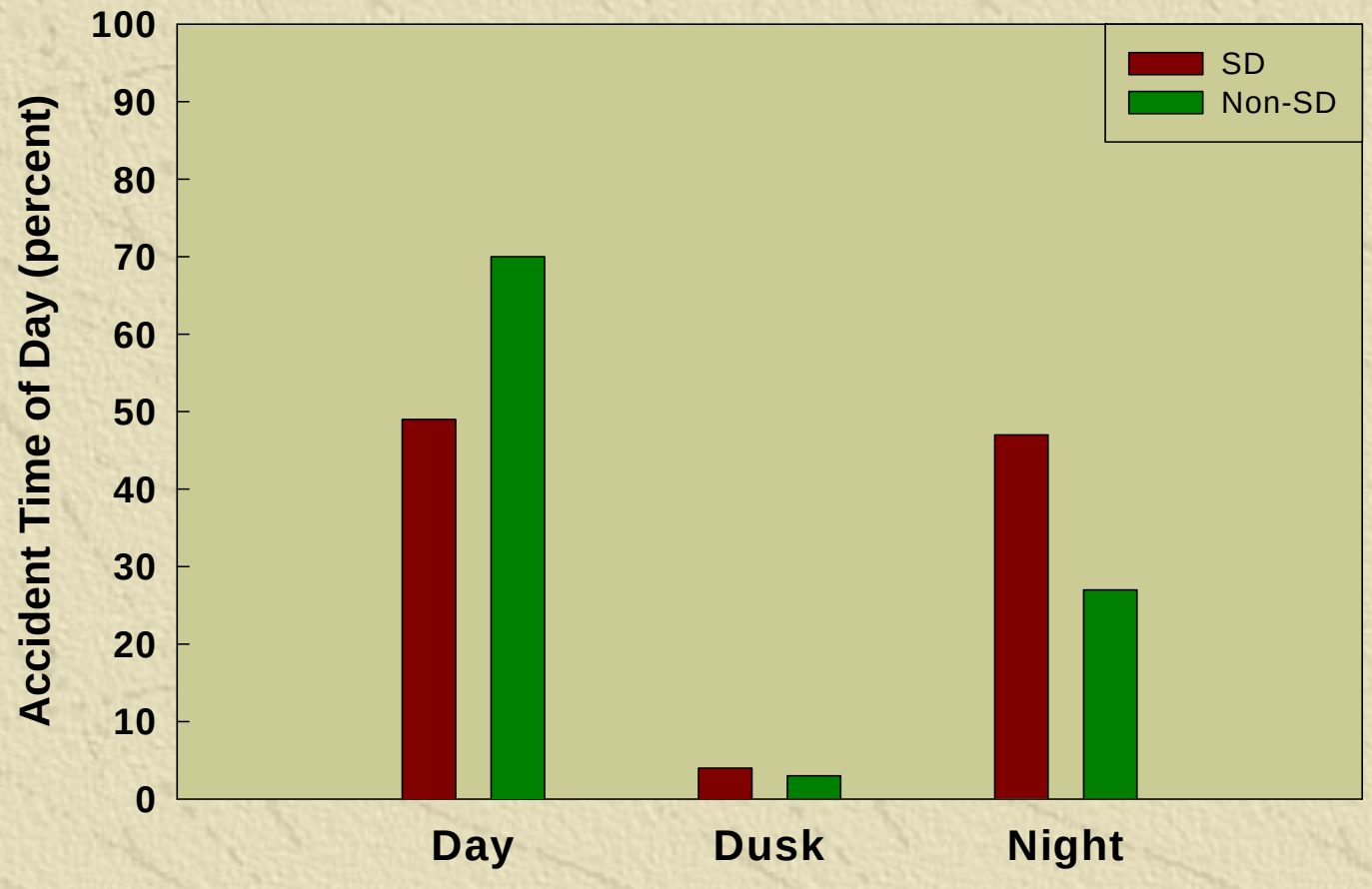
SD accidents were 3 times more fatal than Non-SD accidents.

Results



Of the 488 accidents, 315 occurred during the day (65%), 17 at dusk (3%), and 156 at night (32%).

Results



Percent of SD and Non-SD accidents at each time of day.

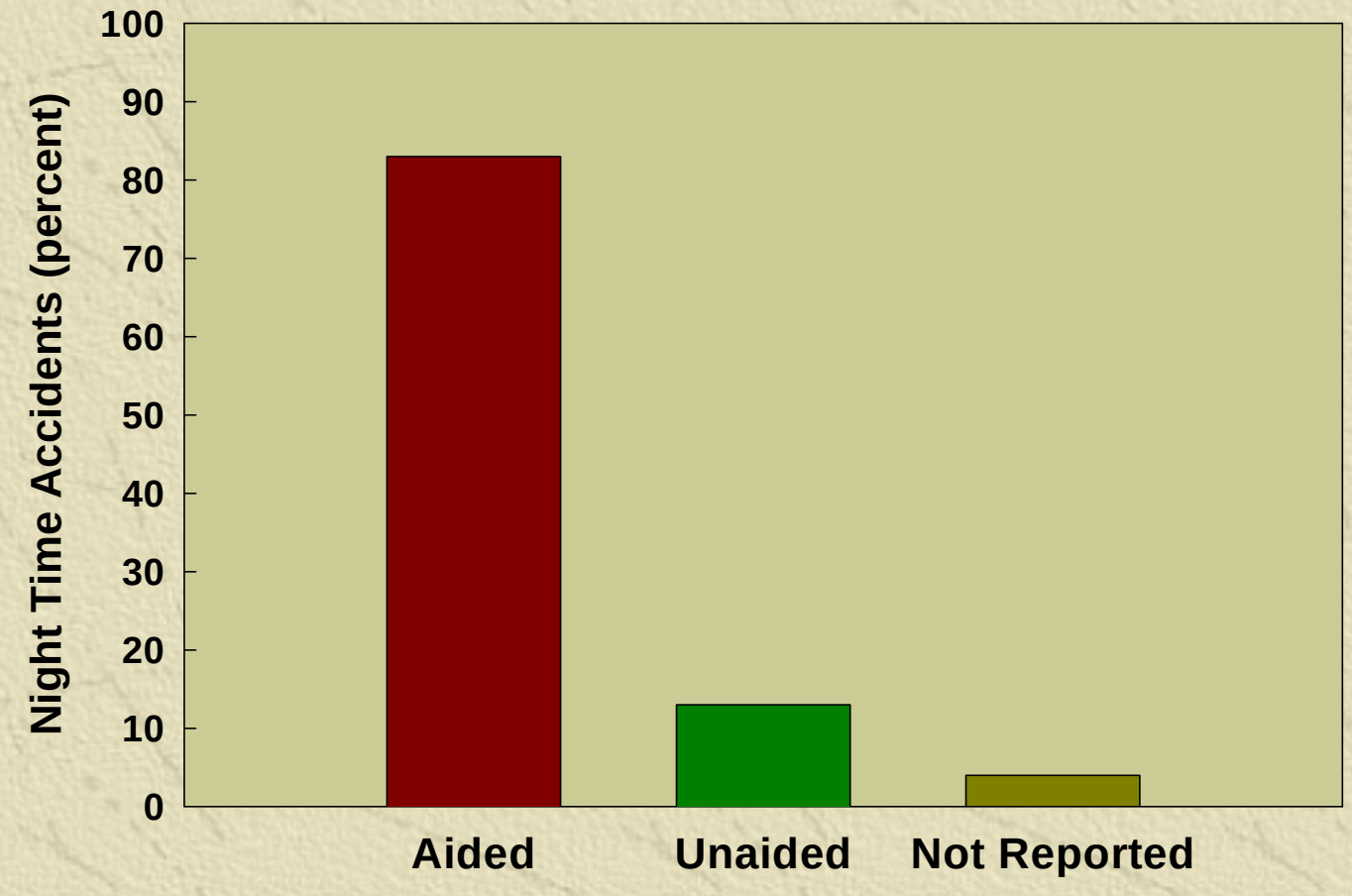
Results

	AH1	UH1	AH64	AH64D	CH47	MH47	CH53	CH53D	UH60	MH60
Night Accidents	4	7	39	3	20	8	5	26	36	9
Night SD Accidents	1	4	19	1	3	1	1	10	17	7
*	25%	57.1%	48.7%	33.3%	15%	12.5%	20%	38.5%	47.2%	77.7%

Percent of night SD accidents by airframe

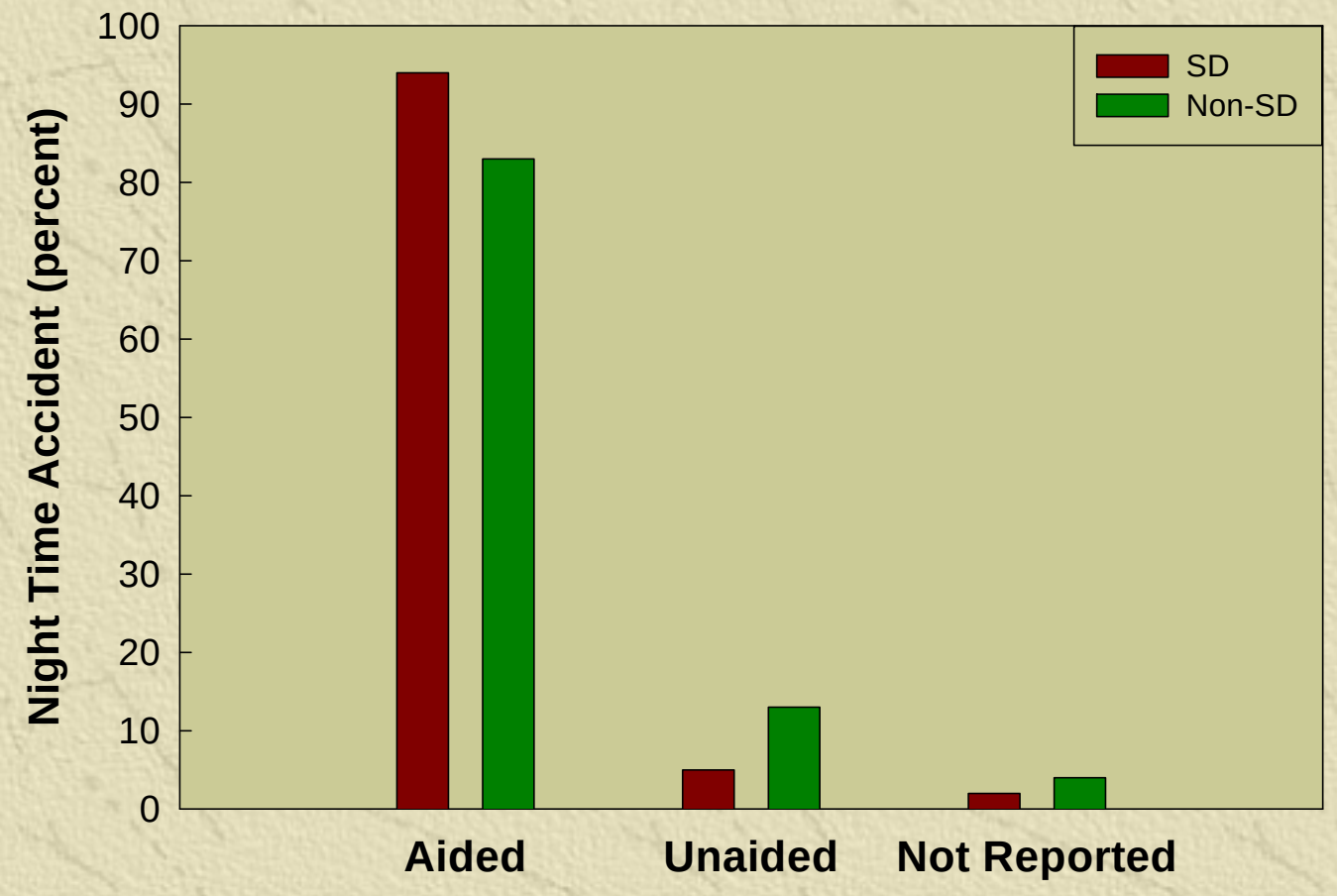
*** not normalized by 100,000 flight hours**

Results



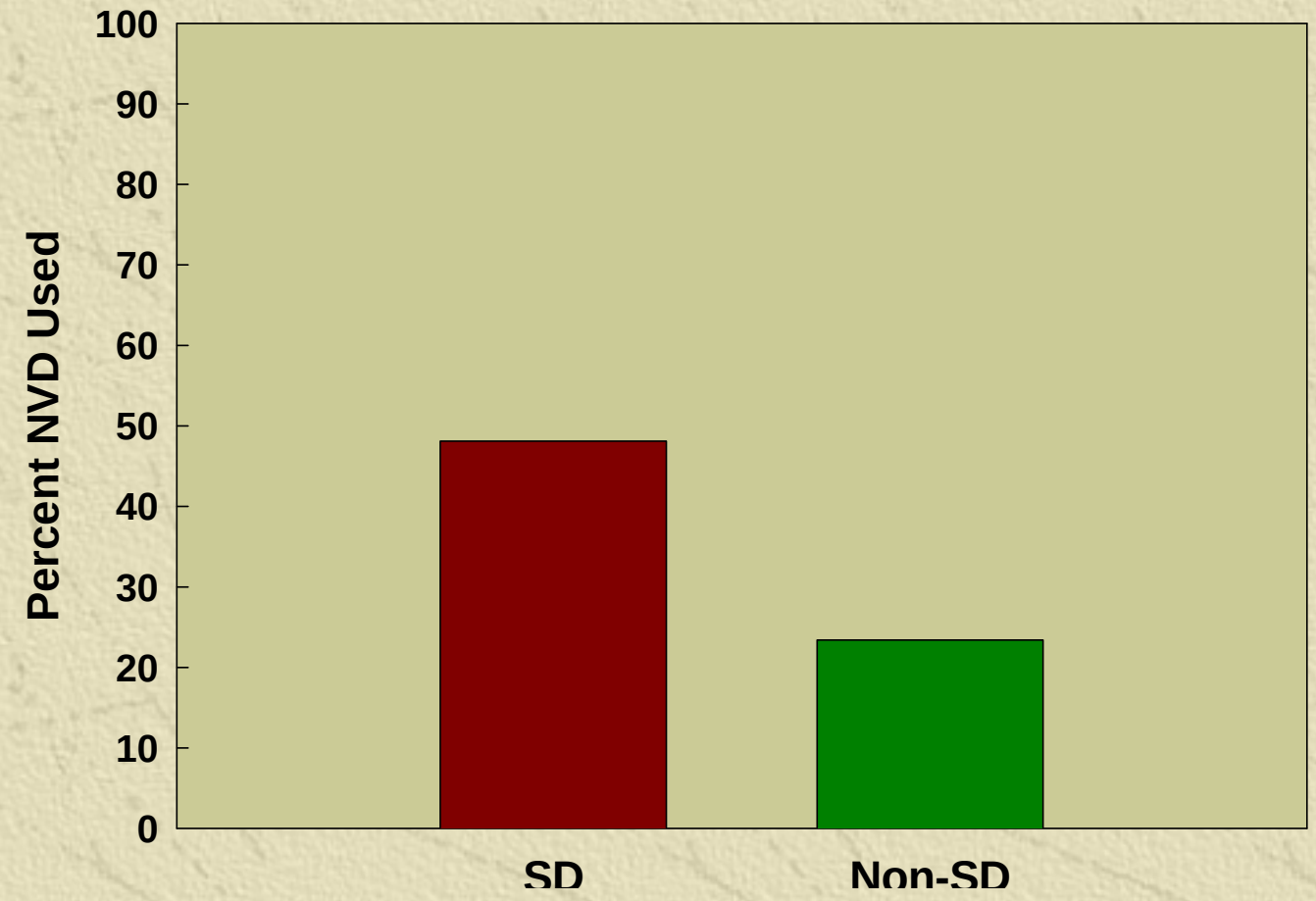
Of the 156 night accidents there were 136 (83%) aided, 15 unaided (13%), and 4 not reported (4%).

Results



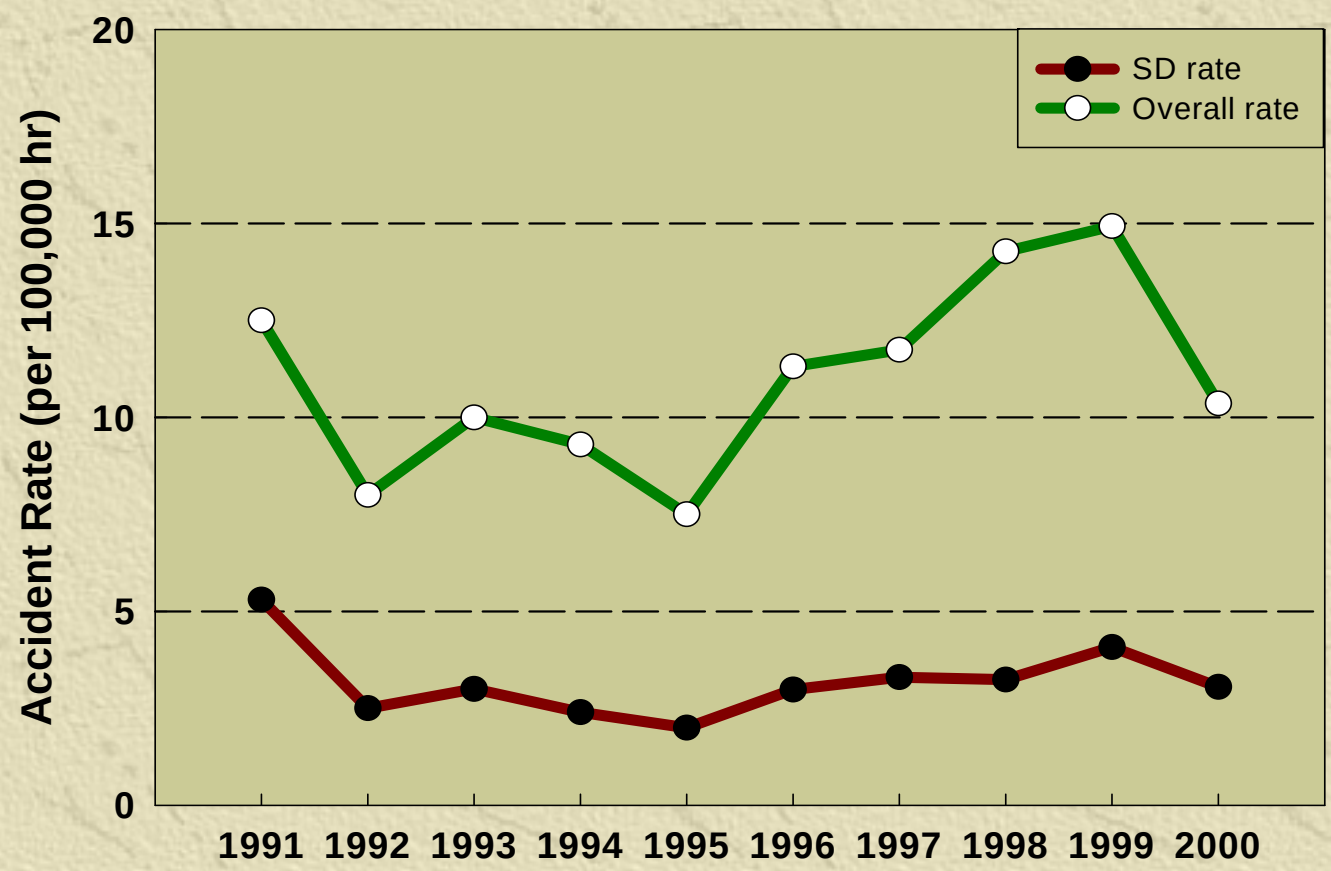
Percent of SD and Non-SD accidents during each type of night flight.

Results



The percent of SD accidents in which NVDs were in use was double than of Non-SD accidents.

Results



Overall and SD rotary-wing accident rates for the past decade.

Discussion

- Preliminary results are similar to reviews by Durnford et al., 1995 and Braithwaite et al., 1977
- SD accidents are more costly in terms of lives than non-SD accidents
- SD accidents are more costly in terms of dollars than non-SD accidents

Discussion

- Classic SD accidents were uncommon (1 of 133)
- Most SD accidents were due to inadvertent drift and misjudging distances (116 of 133)
- 47 % of SD accidents occur at night compared to 27% of non-SD accidents

Discussion

- The % of SD accidents in which NVDs were in use was double that of non-SD
- Comparison with FY 91-95 data showed that the SD accident rate is not decreasing
- If anything, since 1995 the SD accident rate has slowly started increasing